WHAT IS CLAIMED IS:

1. A dielectric film formed directly or indirectly on at least a part of a glass substrate or a plastic substrate, comprising silicon oxide in a part at least in the direction of the film thickness, the composition ratio of silicon and oxygen being between 1:1.94 and 1:2 both inclusive.

2. A dielectric film formed directly or indirectly on at least a part of a glass substrate or a plastic substrate, comprising silicon nitride in a part at least in the direction of the film thickness, the composition ratio of silicon and nitrogen being between 3:3.84 and 3:4 both inclusive.

3. A dielectric film formed directly or indirectly on at least a part of a glass substrate or a plastic substrate, comprising silicon oxide in which the composition ratio of silicon and oxygen is between 1:1.94 and 1:2 both inclusive, or silicon oxynitride in which the composition ratio of silicon and nitrogen being between 3:3.84 and 3:4 both inclusive, in a part at least in the direction of the film thickness.

4. A dielectric film according to any one of claims 1 through 3, wherein a silicon layer or a silicon compound layer is formed directly or indirectly on at least a part of said glass substrate or said plastic substrate, and wherein said dielectric film is formed on at least a part of said silicon layer or said silicon compound layer.

5. A dielectric film according to any one of claims 1 through 3, wherein said plastic substrate is made of polyimide resin, polyetherketone resin, polyethersulfone resin, polyetherimide resin, polyethylenenaphthalate resin or polyester resin.

6. A method of forming a dielectric film according to any one of claims 1 through 3, comprising steps of: preparing a substrate having in the surface of a silicon layer formed directly or indirectly at least on a part of said glass substrate or said plastic substrate; and processing the surface of said silicon layer in plasma having an electron density 3×10^{11} cm^{-3} or over formed by exciting a gas composed of at least one element constituting said dielectric film.

7. A method of forming the dielectric film according to claim 6, wherein said gas is composed of an oxygen molecule, or a molecular nitrogen or an ammonia molecule.

8. A method of forming the dielectric film according to claim 6, wherein said gas further contains a gas composed of a rare gas element, and wherein the partial pressure of said gas composed of the rare gas element is 90% or over of the total pressure.

9. A method of forming a dielectric film according to claim 8, wherein said rare gas element is argon, or xenon or krypton.

10. A method of forming a dielectric film according to claim 6, wherein said gas is an oxygen molecule, said rare gas element is xenon, and the energy of a light generated from said plasma is 8.8 eV or less.

11. A method of forming a dielectric film according to claim 6, wherein a frequency of a power supplier for generating said plasma is 2.45 GHz or over.

12. A method of forming a dielectric film according to claim 6, wherein said glass substrate or said plastic substrate is heated at a temperature between 90°C and 400°C both inclusive.

13. A semiconductor device having a dielectric film formed on at least a part of a silicon layer formed directly or indirectly on at least a part of a glass substrate or a plastic substrate, said dielectric film comprising silicon oxide in which the composition ratio of silicon and oxygen is between 1:1.94 and 1:2 both inclusive in a part at least in the direction of the film thickness.

14. A semiconductor device having a dielectric film formed on at least a part of a silicon layer formed directly or indirectly on at least a part of a glass substrate or a plastic substrate, said dielectric film comprising silicon nitride in which the composition ratio of silicon and nitrogen is between 3:3.84 and 3:4 both inclusive in a part at least in the direction of the film thickness.

15. A semiconductor device having a dielectric film formed on at least a part of a silicon layer formed directly or indirectly on at least a part of a glass substrate or a plastic substrate, said dielectric film comprising silicon oxynitride having silicon oxide in which the composition ratio of silicon and oxygen is between 1:1.94 and 1:2 both inclusive in a part at least in the direction of the film thickness or silicon nitride in which the composition ratio of silicon and nitrogen is between 3:3.84 and 3:4 both inclusive in a part at least in the direction of the film thickness.

16. A semiconductor device according to any one of claims 13 through 15, wherein said dielectric film constitues a part of a gate dielectric layer relative to the direction of the thickness of the gate dielectric layer.

17. A semiconductor device according to any one of claims 13 through 15, wherein said plastic substrate is made of polyimide resin, polyetheretherketone resin, polyethersulfone resin, polyetherimide resin, polyethylenenaphthalate resin or polyester resin.

18. A method of producing a semiconductor device according to any one of claims 13 through 15, comprising steps of: preparing a substrate having a silicon layer formed directly or indirectly on at least a part of said glass substrate or said plastic substrate; and processing the surface of said silicon layer in plasma having an electron density of 3×10^{11} cm^{-3} or over formed by exciting a gas composed of at least one element constituting said dielectric film.

19. A method of producing a semiconductor device according to claim18, wherein said gas is composed of an oxygen molecule, or a molecular nitrogen or an ammonia molecule.

20. A method of producing the semiconductor device according to claim18, wherein said gas further contains a gas composed of a rare gas element, and wherein the partial pressure of the rare gas element is 90% or over of the total pressure.

21. A method of producing the semiconductor device according to claim 20,

wherein said rare gas element is argon, or xenon or krypton.

22. A method of producing a semiconductor device according to claim 20, wherein said gas is an oxygen molecule, said rare gas element is xenon, and the energy of a light generated from the plasma is 8.8 eV or less.

23. A method of producing the semiconductor device according to claim 18, wherein a frequency of a power supplier for generating said plasma is 2.45 GHz or over.

24. A method of producing the semiconductor device according to claim 18, wherein said glass substrate or said plastic substrate is heated at a temperature between 90°C and 400°C, inclusive.

25. A method of producing the semiconductor device according to claim 18, wherein said dielectric film is a gate dielectric layer of a thin film transistor.